A.D. 1855 . . . . . N° 1980.

SPECIFICATION

OF

WILLIAM SMITH.

FURNACES.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
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1856.

Price 10d.

A.D. 1855 . . . . . N° 1980.

Furnaces.

LETTERS PATENT to William Smith, of 10, Salisbury Street, Adelphi, in the County of Middlesex, Civil Engineer, for the Invention of "AN IMPROVED SMOKE-CONSUMING FURNACE."—A communication.

Sealed the 26th February 1856, and dated the 1st September 1855.

PROVISIONAL SPECIFICATION left by the said William Smith at the Office of the Commissioners of Patents, with his Petition, on the 1st September 1855.

I, WILLIAM SMITH, of No. 10, Salisbury Street, Adelphi, in the County of Middlesex, do hereby declare the nature of the said Invention for "AN IMPROVED SMOKE-CONSUMING FURNACE," that it is a communication from a foreigner residing abroad, to be as follows:—

It consists in the arrangement of a double set of furnace bars mounted in a horizontal frame, which turns upon a vertical axis, and by a half revolution presents alternately one of two sets of the furnace bars for a charge of fresh fuel; and the more remote hearth or set of furnace bars will contain the fuel in the high state of ignition or incandescence, whilst the gases given off from the fresh fuel must pass therethrough, and become ignited and consumed thereby.

Smith's Improved Smoke-consuming Furnace.

A perforated bridge may divide the two furnaces, extending from side to side, and permitting the gases and particles of carbon from the outer furnace, or that nearest to the front of the boiler, to pass only in the desired direction. This furnace effects considerable economy in the consumption of fuel, because the heat which in furnaces of ordinary construction escapes in the form of smoke or fine particles of carbon, whilst they cannot so escape in my furnace. Moreover, the cold air which is admitted into an ordinary furnace, producing a cooling and injurious effect during the time that the door remains open, is entirely prevented from so acting in my improved furnace.

When the fuel in the second furnace, or the one furthest from the front of the boiler, is sufficiently consumed, the frame is so turned as to bring that furnace or hearth immediately in front of the opening ready to receive a fresh charge of fuel. Thus, these hearths or frames alternately change places.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said William Smith in the Great Seal Patent Office on the 1st March 1856.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, William Smith, of 10, Salisbury Street, Adelphi, in the County of Middlesex, Civil Engineer, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the First day of September, in the year of our Lord One thousand eight hundred and fifty-five, in the nineteenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said William Smith, Her special licence that I, the said William Smith, my executors, administrators, and assigns, or such others as I, the said William Smith, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**An Improved Smoke-consuming Furnace**," (a communication,) upon the condition (amongst others) that I, the said William Smith, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent

Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said William Smith, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This Invention, as communicated to me, consists in the arrangement of a double set of bars mounted on a horizontal frame, which turns upon a vertical axis, and by a half revolution presents alternately one of two sets of the furnace bars for charge of fresh fuel; and in more remote hearth or set of furnace bars will contain the fuel in the high state of ignition or incandescence, whilst the gases given off from the fresh fuel must pass theirthrough, and become ignited and consumed thereby.

A perforated bridge may divide the two furnaces, extending from side to side, and permitting the gases and particles of carbon from the outer furnace, or that nearest to the front of the boiler, to pass only in the desired direction. This furnace effects considerable economy in the consumption of fuel, because a large amount of the gases or heat-giving qualities which in furnaces of ordinary construction escapes in the form of smoke and fine particles of carbon, whilst they cannot so escape in this furnace, but impart fresh aliment to the second furnace. Moreover, the cold air which is admitted into an ordinary furnace, producing a cooling and injurious effect upon the furnace and the fuel during the time the door remains open, is entirely prevented in the present furnace from so acting.

When the fuel in the second furnace, or the one further from the front of the boiler, is sufficiently consumed, the frame is turned sufficiently far to bring that furnace or hearth immediately in front of the opening ready to receive a fresh charge of fuel. Thus, these hearths or furnaces alternately change places, and the fresh fuel placed alternately thereupon becomes consumed more perfectly and economically, giving out the largest quantity of heat, preventing formation of smoke in the furnace, and which would otherwise escape from the chimney. This construction of furnace can be applied with similar advantage to locomotive boilers and the boilers of marine and land engines, also for brewery, distillery, and other kinds of furnaces.

The general construction and arrangement of furnaces made according to this Invention will, on reference to the following description and the accompanying Drawing, which, although it exhibits its application to one form of boiler only, will readily convey the mode of applying the same construction of furnaces to other forms or description of boilers:—

Smith's Improved Smoke-consuming Furnace.

Description of the Apparatus.

Fig. 1 in the accompanying Drawing represents a longitudinal section made at the axis of the apparatus, and lengthwise of the furnace; Fig. 2 is a plan or horizontal section of Fig. 1, exhibiting the two sets of furnace bars, bridge, &c.; Fig. 3 is a transverse section of Fig. 1 and 2, and exhibits the construction of the furnace, the supporting frame, and other parts of the arrangement; Fig. 4 is a front view of the boiler seating and the apparatus, as seen externally. The same letters serve to indicate the similar parts in each of those Figures.

By these Figures it will be seen that the apparatus consists of a circular frame A, which bears the similar and opposite grates E, E, is furnished underneath with a toothed rack L, which it is worked by a pinion J, the prolonged axis of which outside of the furnace is supplied with a crank handle to work by hand whenever it is necessary to change the position of the furnace bars. It is by means of this rack and pinion that the frame and the two grates are caused to make a semi-revolution, so as to be brought forward alternately fr the mouth of the furnace. For this purpose it is guided in its circumference by an iron ring or tram plate O, partly imbedded in the brickwork, and it is thoroughly supported by a vertical shaft or spindle B, which rests and turns upon a fixed pivot or stud I. A brick bridge or partition C is formed under the frame in order to divide the two grates, having therein one or several openings D, forming a passage or passages for the air and gases to pass through to the second furnace. This partition can evidently be constructed in various ways, and the openings or holes may also be of different forms and dimensions, according to the arrangement of the gra e or the proportion of the furnace, or one part, the upper, may remain fixed, adapted at need to the boiler, and it may be supported or held by one or several bolts, and the lower part only may be moveable with the apparatus itself.

In the front of the furnace may be also placed a hopper or feeder with a projector, which being worked by the hand of the stoker would deliver, as required, the necessary quantity of fuel upon the grate immediately underneath, or the latter may be simply fed by means of a shovel, as is now done in the ordinary system, by opening the door at the entrance R.

Working of the Apparatus.

To set the apparatus in action, it is proper at first to cover one of the grates with fuel, which is lit by the usual means. Immediately afterwards turn the frame upon itself, so that this grate charged with coke becomes placed near

the bridge C, which divides the double hearth from the principal flue, running the whole length of the tubes; the draught or current of air being necessarily very strong in this position, the fire burns very briskly. Then the second grate which has been brought forward is charged with fuel. The draught of this hearth is evidently much less than that of the former. The result is, that the smoke escapes but slowly and gradually, whilst the former fire becomes more and more vigorous, and consumes it completely and imperceptibly as fast as it makes the flames; the whole is left thus until the former grate becomes cleared and the steam begins to fail. It is necessary, therefore, to cause the frame to make a semi-revolution, so that this grate may be re-charged with fresh fuel in the manner before described, and being brought forward to take its place operates also in a similar manner, and thus consumes the smoke completely. The stoker in turning the handle need never fear prolonging the movement of the frame beyond the necessary degree, because the rack should be made exactly, so as to present one of its stops or its termination, so as to prevent the pinion from becoming ungeared or turning the frame table too far.

Having described this Invention as communicated to me, and exhibited its application to one form of boiler, as shewn in the accompanying Drawing, and having also explained that it may be applied to other boilers and vessels of various forms and for various purposes, I wish it to be understood that what is claimed is, the arrangement of a double grate or sets of furnace bars divided by a bridge, and affixed to or mounted upon a table capable of making a whole or half revolution, turned by means of a circular rack and pinion or otherwise, and whether supported upon a centre shaft or pillar, as shewn, or by any other similar and equivalent means, by which the same general arrangement is preserved.

In witness whereof, I, the said William Smith, have hereunto set my hand and seal, the First day of March, in the year of our Lord One thousand eight hundred and fifty-six.

WILLIAM SMITH. (L.S.)

Witness,
JOHN DYTE.

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FIG. 1.

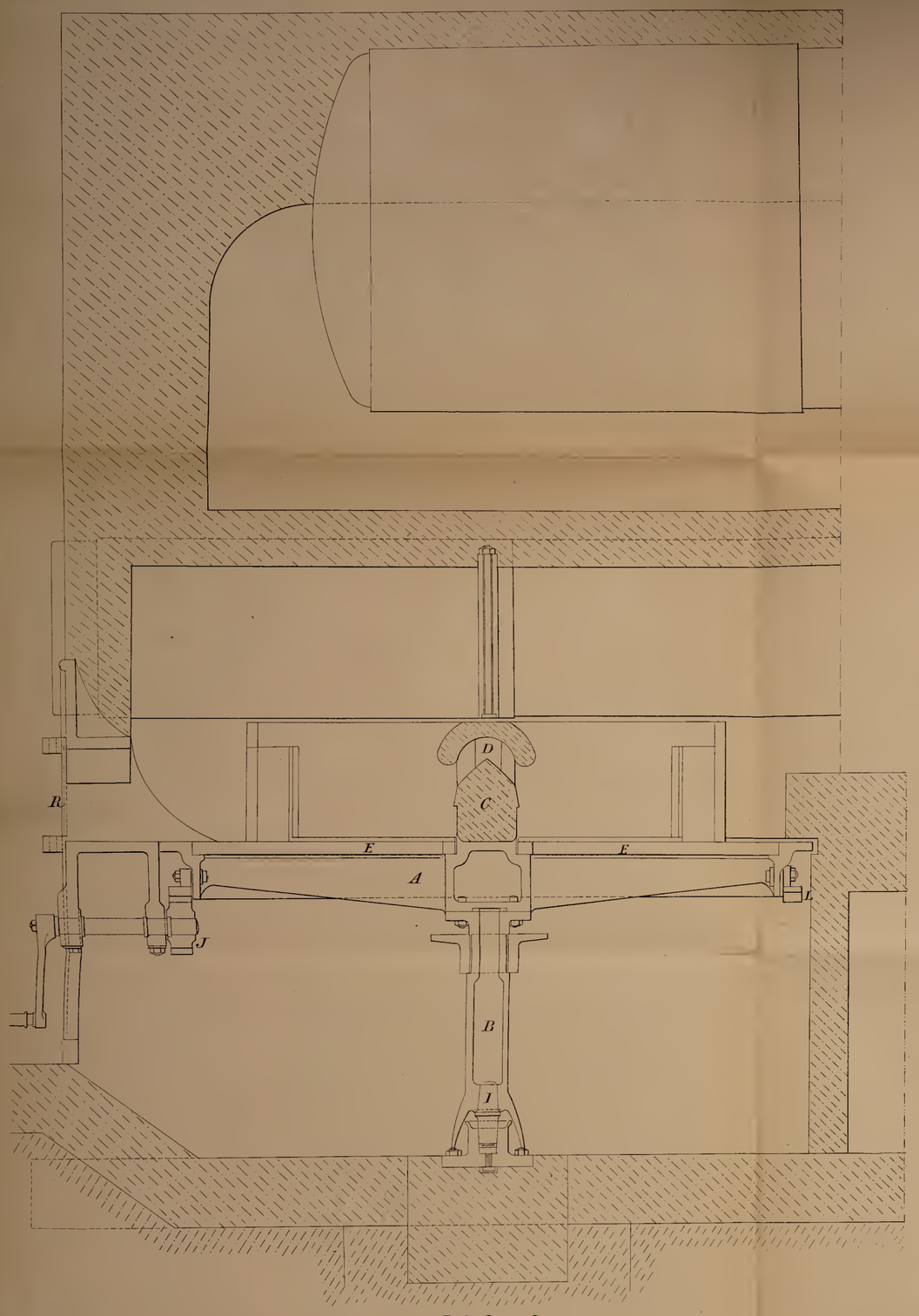


FIG. 3.

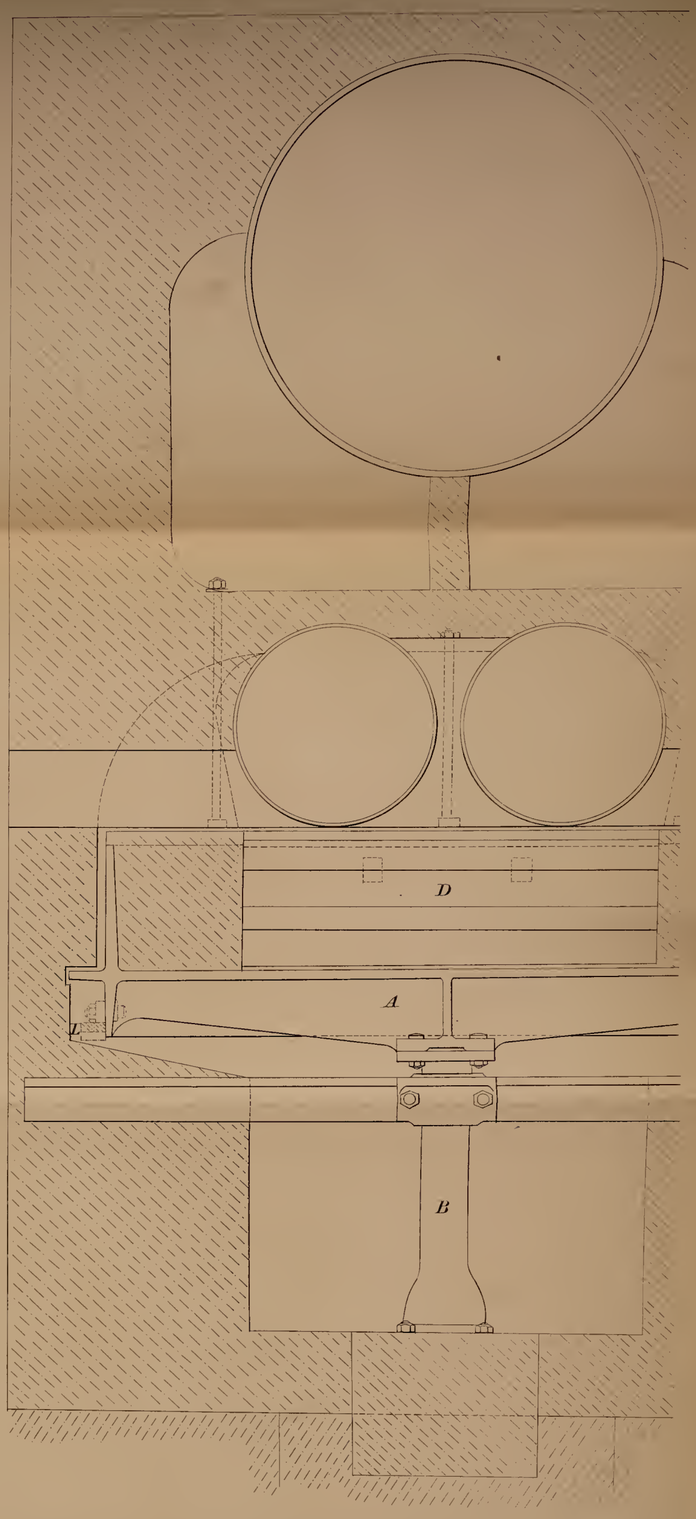


FIG. 2.

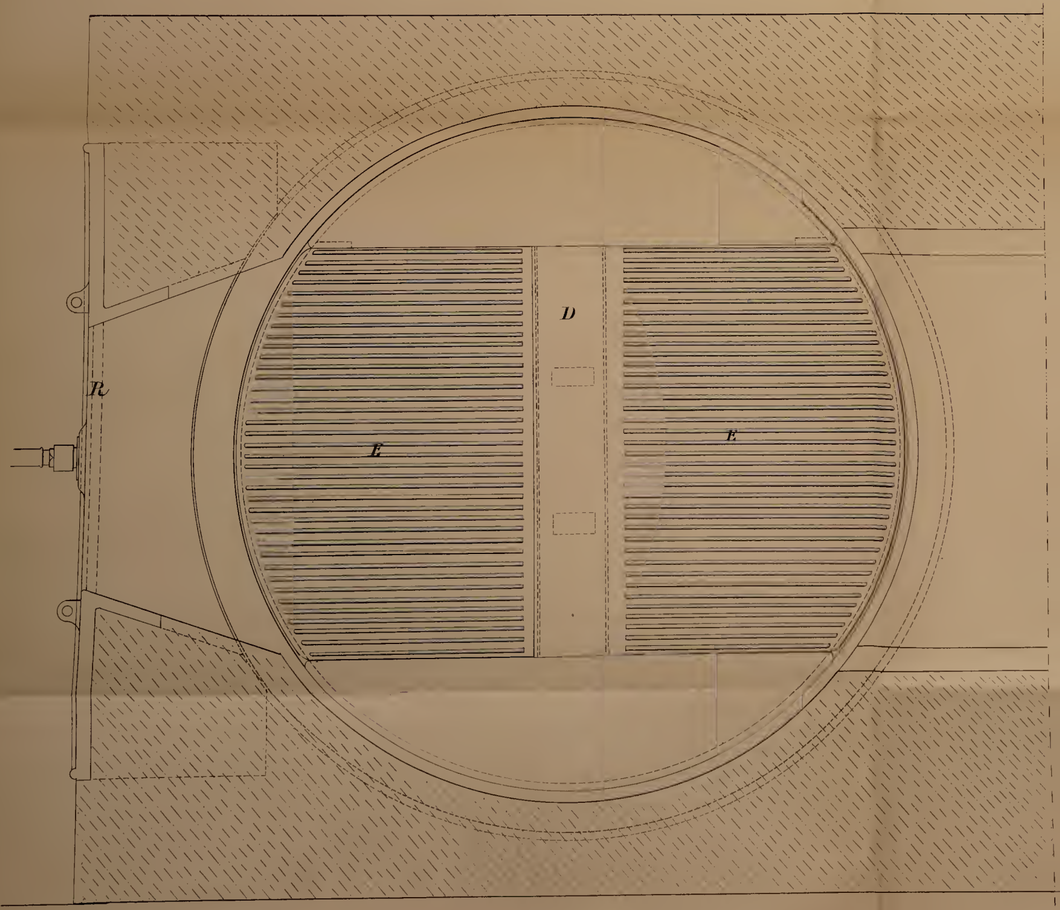
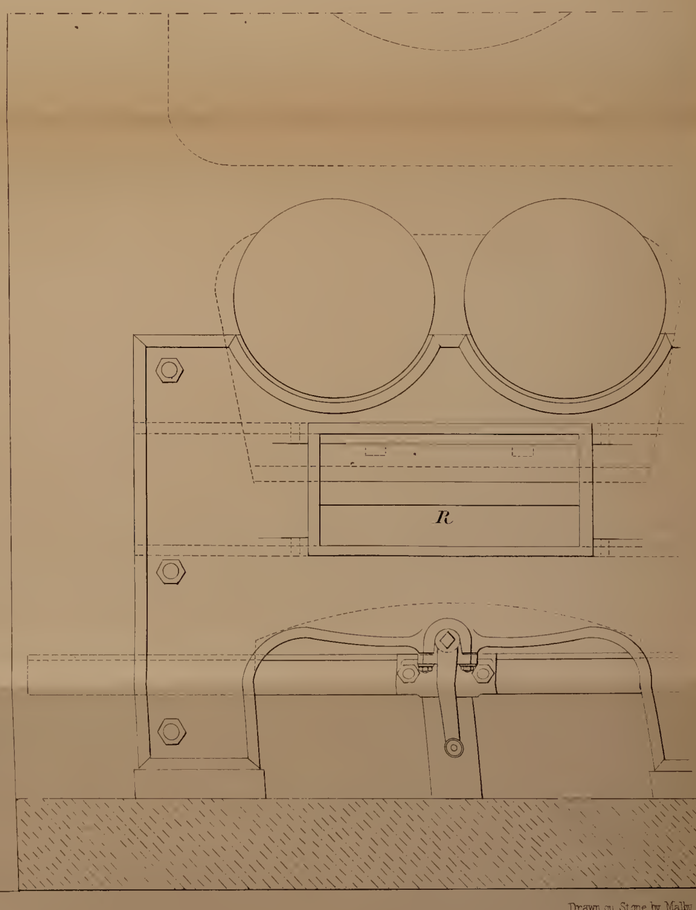


FIG. 4.



The filled drawing is partly colored.

Drawn on Stone by Malby & Sons

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Printers to the Queen's most Excellent Majesty 1856.